

Application No.: 09/524,587
Amendment Dated: June 17, 2004
Reply to Office Action of: April 20, 2004

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Withdrawn) A surface lighting device having a light source and a light-guide-member, said light-guide-member comprising:

an incident plane for receiving light emitted from said light source and for producing incident light;

a light-guiding-section for receiving said incident light and for producing guided light; and

a light-emitting-section for receiving said guided light and for producing emitted light,

wherein a length of shorter side of said light-guiding-section is not more than 8 mm, an area of said light-emitting-section is not less than 500 mm², a ratio of minimum luminance vs. maximum luminance of said light-emitting-section is not less than 0.3, an average luminance of said light-emitting-section ranges from 1 cd/m² to 200 cd/m², and a luminance change amount per unit length is not more than (average luminance) × 100 cd/m³.

2. (Withdrawn) The surface lighting device as defined in Claim 1 further comprising a barrier plate for blocking the light emitted from entering directly to said light-guide-member.

3. (Withdrawn) The surface lighting device as defined in Claim 2 wherein said barrier plate has a reflecting function.

4. (Withdrawn) The surface lighting device as defined in Claim 2 further comprising a holder for accommodating said light-guide-member, wherein said holder and said barrier plate are unitarily molded.

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5. (Withdrawn) The surface lighting device as defined in Claim 2 further comprising a reflecting member for reflecting the light emitted toward outer circumference of said light-guiding-section.

6. (Withdrawn) The surface lighting device as defined in Claim 5 wherein said holder, said barrier plate and said reflecting member are unitarily molded.

7. (Withdrawn) The surface lighting device as defined in Claim 1 wherein the emitted light reflects on outer circumference of said light-guiding-section, then travels to said light-emitting-section.

8. (Withdrawn) The surface lighting device as defined in Claim 1 further comprising a light scattering layer disposed on a face opposite to said light-emitting-section.

9. (Withdrawn) The surface lighting device as defined in Claim 1 wherein said light-emitting-section has a light-scattering-member thereon.

10. (Withdrawn) The surface lighting device as defined in Claim 1 wherein a half width of a light emitting wavelength of said light source is not more than 50 nano-meter.

11. (Withdrawn) The surface lighting device as defined in Claim 1 wherein said light source is a light-emitting-diode having a cylindrical lens.

12. (Withdrawn) The surface lighting device as defined in Claim 1 wherein said light source is disposed on a corner of said light-guide-member.

13. (Withdrawn) The surface lighting device as defined in Claim 12 wherein said light-guiding-section has a reflecting face.

14. (Withdrawn) A portable terminal having a display device and a surface lighting device including a light source and light-guide-member, said light-guide-member comprising:

a light inlet for receiving light from said light source and for producing received light;

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a light-guiding-section for receiving said received light and for producing guided light; and

a light-emitting-section for receiving said guided light and for producing emitted light, wherein;

a ratio of a minimum luminance of said emitted light and maximum luminance of said emitted light is equal to or greater than 0.3;

an average luminance of said emitted light is in a range of 1 cd/m² to 200 cd/m², and

a change in luminance of said emitted light per unit length is less than or equal to said average luminance \times 100 cd/m³,

wherein a length of a side of said light-guiding-section is not more than 8 mm, and an area of said light-emitting-section is not less than 500 mm².

15. (Withdrawn) A surface lighting device having a plurality of light sources and a light-guide-member comprising:

a light inlet for receiving light from said plurality of light sources and for producing received light;

a light-guiding-section for receiving said received light and for producing guided light; and

a light-emitting-section for receiving said guided light and for producing emitted light, wherein,

a ratio of a minimum luminance of said emitted light and maximum luminance of said emitted light is equal to or greater than 0.3;

an average luminance of said emitted light is in a range of 1 cd/m² to 200 cd/m², and

a change in luminance of said emitted light per unit length is less than or equal to said average luminance \times 100 cd/m³,

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wherein a length of a side of said light-guiding-section is not more than 8 mm, and an area of said light-emitting-section is not less than 500 mm².

16. (Withdrawn) The surface lighting device as defined in Claim 15 wherein said light source is disposed on a corner of said light-guide-member, and an approximation line connecting respective emitting centers of said light emitting elements is disposed to form approximately right angles with a diagonal line of said light-guide-member.

17. (Withdrawn) The surface lighting device as defined in Claim 15 wherein said light source is disposed on a corner of said light-guide-member, and an approximation line connecting respective emitting centers of said light emitting elements is disposed to form an angle with a longer side of said light-emitting-section, said angle being greater than another angle formed by the approximation line and a shorter side of said light-emitting-section.

18. (Withdrawn) The surface lighting device as defined in Claim 15 wherein the approximation line is disposed to separate said light-emitting-section into two approximately equivalent areas.

19. (Withdrawn) The surface lighting device as defined in Claim 15, wherein the light travelling in a third direction is guided from around a center of an end face of said light-guide-member into said light-guide-member wherein a first direction runs along a main light-axis of said light source, and a second direction runs along a light axis toward said light-emitting-section from said light-guiding-section, the third direction runs in a plane other than a plane including the first and the second directions,

wherein an approximation line connecting respective emitting centers of said light-emitting-elements is disposed to be approximately parallel to the second direction.

20. (Withdrawn) The surface lighting device as defined in Claim 15, wherein said light source comprises:

an insulated substrate to be mounted with said light emitting elements;

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a light-transparent member disposed on said substrate to cover said light emitting elements; and

an electrode disposed on at least an upper face of said substrate.

21. (Withdrawn) The surface lighting device as defined in Claim 15, wherein said respective light emitting elements is disposed at approximately the same distance from said light-guide-member.

22. (Withdrawn) The surface lighting device as defined in Claim 15, wherein said light emitting elements change color tones by varying electric current flowing therethrough.

23. (Currently Amended) A surface lighting device comprising:

a light-guide-member including:

a light-inlet plane;

a light reflecting plane above said light inlet plane;

a light-guiding-section;

a light-emitting-section plane and side planes; and

a light source disposed on a corner of said light-guide-member,

wherein an angle formed by ~~two~~ said side planes of said light-guide-member, where said light-inlet plane exists between the ~~two~~ side planes, is an acute angle.

24. (Original) The surface lighting device as defined in Claim 23, wherein at least one of the two planes approaches a emitting face at greater distance from said light source.

25. (Withdrawn) The surface lighting device as defined in Claim 23 further comprising a diffused reflection board disposed parallel to said light-emitting-section.

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26. (Original) The surface lighting device as defined in Claim 24, wherein at least one of the two planes approaches a emitting face at greater distance from said light source.

27. (Previously Presented) The surface lighting device as defined in Claim 23, wherein said light-inlet plane includes an end face slant with respect to said light-emitting-section and an incident plane, and said light source is disposed on an opposite side of said end face, where said incident face exists in-between.

28. (Previously Presented) The surface lighting device as defined in Claim 27, wherein the end face of said light-inlet plane comprises a curved face widening in sector shape from near said light source.

29. (Original) The surface lighting device as defined in Claim 23, wherein said light source is a light-emitting-diode having a substantially concave face.

30. (Original) The surface lighting device as defined in Claim 23, wherein said light source is a single piece of light-emitting-diode.

31. (Original) The surface lighting device as defined in Claim 23, wherein the light-emitting-diode comprises a plurality of light emitting elements.

32. (Currently Amended) A display unit comprising:

- a liquid crystal display element; and
- a surface lighting device comprising;
- a light-guide-member including:
- a light-inlet plane;
- a light reflecting plane above said light inlet plane;
- a light-guiding-section;
- a light-emitting-section plane and side planes; and
- a light source disposed on a corner of said light-guide-member,

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wherein an angle formed by ~~two said side~~ planes of said light-guide-member, where said light-inlet exists between the ~~two side~~ planes, is an acute angle.

33. (Withdrawn) The display unit as defined in Claim 32, wherein said light source is disposed on a side where a wiring of the liquid crystal display element is led out.

34. (Original) The surface lighting device as defined in Claim 32, wherein two sides adjacent to said light source are longer than other sides respectively.

35. (Original) The surface lighting device as defined in Claim 32, wherein said light source includes at least one light-emitting-element.

36. (Currently Amended) A portable terminal comprising:

a liquid crystal display element; and

a surface lighting device comprising;

a light-guide-member including:

a light-inlet plane;

a light reflecting plane above said light ~~inlet~~inlet plane;

a light-guiding-section;

a light-emitting-section ~~plane and side planes~~; and

a light source disposed on a corner of said light-guide-member,

wherein an angle formed by ~~two said side~~ planes of said light-guide-member, where said light-inlet exists between the ~~two side~~ planes, is an acute angle.

37. (Withdrawn) A surface lighting device comprising:

a light-guide-member including:

a light-inlet;

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a light-guiding-section; and

a light-emitting-section; and

a light source disposed on a corner of said light-guide-member;

wherein at least one plate of a first and a second plates, between which said light-inlet exists, approaches said light-emitting-section at a greater distance from said light source.

38. (Withdrawn) The surface lighting device as defined in Claim 37, wherein said light-inlet comprises a slanted end face of said light-guide-member and a reflecting material is disposed on said end face, and said light source is disposed under said light-inlet.

39. (Withdrawn) A surface lighting device comprising:

a light-guide-member including:

a light-inlet;

a light-guiding-section; and

a light-emitting-section; and

a light source disposed on a corner of said light-guide-member;

wherein a first side and a second side of said light-guide-member cramp a small side including said light-inlet, where a third side is opposite to the first side and a fourth side is opposite to the second side,

wherein a first intersecting point is formed by the first and second sides, and a second intersecting point is formed by the third and the fourth sides, and a line connecting the first and the second intersecting points forms an angle ranging from 75 degrees to 105 degrees with a line connecting a closer end point of the first side to said light source and a closer end point of the second side to said light source.

40. (Withdrawn) A display unit comprising:

a surface lighting device comprising:

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a light-guide-member including:

a light-inlet;

a light-guiding-section; and

a light-emitting-section; and

a light source disposed on a corner of said light-guide-member,

wherein an angle formed by two planes of said light-guide-member, where said light-inlet exists between the two planes, is an acute angle,

a holder for accommodating said light-guide-member;

a liquid crystal display element;

a circuit board; and

a wiring for coupling said liquid crystal display element with said circuit substrate,

wherein said light-guide-member has a first side above which said wiring is routed, said holder has a second side on an outer frame thereof and above which said wiring is routed, and said liquid-crystal-display element has a third side from which said wiring is led out,

wherein said first side is not parallel to said second side, and said first side is approximately parallel to said third side.

41. (Withdrawn) The display unit as defined in Claim 40 wherein said surface lighting device is disposed behind said liquid crystal display element.

42. (Withdrawn) The display unit as defined in Claim 40, wherein said light source is disposed on the side of said surface lighting device where said wiring is routed.

43. (Currently Amended) A portable terminal comprising:

a surface lighting device comprising:

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a light-guide-member including:
a light-inlet plane;
a light reflecting plane above said light inlet plane;
a light-guiding-section;
a light-emitting-section plane and side planes; and
a light source disposed on a corner of said light-guide-member,
wherein an angle formed by ~~two~~ said side planes of said light-guide-member, where said light-inlet exists between the ~~two~~ side planes, is an acute angle, and

a liquid crystal display element.

44. (Withdrawn) A portable terminal comprising:

a surface lighting device comprising:
a light-guide-member including:
a light-inlet;
a light-guiding-section; and
a light-emitting-section; and
a light source disposed on a corner of said light-guide-member,
wherein an angle formed by two planes of said light-guide-member, where said light-inlet exists between the two planes, is an acute angle,
a holder for accommodating said light-guide-member;
a liquid crystal display element;
a circuit board; and

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a wiring for coupling said liquid crystal display element with said circuit substrate,

wherein said light-guide-member has a first side above which said connector is routed, said holder has a second side on an outer frame thereof and above which said connector is routed, and said liquid-crystal-display element has a third side from which said connector is led out,

wherein said first side is not parallel to said second side, and said first side is approximately parallel to said third side.

45. (Withdrawn) A surface lighting device comprising:

a light-guide-member including;

a light-inlet;

a light-guiding-section;

a light-emitting-section;

a light source disposed on a corner of said light-guide-member; and

a light-reflecting-and-diffusion-section having a light-scattering-section and a smooth section at least one of faces of said light-emitting-section,

wherein a ratio of an area occupied by the light-scattering-section on said light-reflecting-and-diffusion-section is uneven.

46. (Withdrawn) The surface lighting device as defined in Claim 45 further comprising a reflecting layer adjacent to the light-scattering-section.

47. (Withdrawn) The surface lighting device as defined in Claim 45, wherein the area occupied by the light-scattering-section on said light-reflecting-and-diffusion-section increases at a greater distance from diagonal line of said light-reflecting-and-diffusion-section.

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48. (Withdrawn) The surface lighting device as defined in Claim 45, wherein the area occupied by the light-scattering-section increases at a greater distance from said light source.

49. (Withdrawn) The surface lighting device as defined in Claim 45, wherein the area occupied by the light-scattering-section increases at a greater distance from an optical center axis of said light source.

50. (Withdrawn) The surface lighting device as defined in Claim 45, wherein the light-scattering-section is formed by printing.

51. (Withdrawn) The surface lighting device as defined in Claim 45, wherein the light-scattering-section is formed with fine peaks and valleys.

52. (Withdrawn) A portable terminal comprising:

a display unit;

a surface lighting device including;

a light-guide-member including;

a light-inlet;

a light-guiding-section;

a light-emitting-section; and

a light source disposed on a corner of said light-guide-member; and

a light-reflecting-and-diffusion-section having a light-scattering-section and a smooth section at least one of faces of said light-emitting-section,

wherein a rate of an area occupied by the light-scattering-section on said light-reflecting-and-diffusion-section is uneven.

53. (Withdrawn) The device according to claim 14, wherein said light-guiding-section has a length equal to or less than 8 mm.

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54. (Withdrawn) The device according to claim 14, wherein said light-emitting section has an area greater than or equal to 500 mm².

55. (Withdrawn) The device according to claim 15, wherein said light-guiding-section has a length equal to or less than 8 mm.

56. (Withdrawn) The device according to claim 15, wherein said light-emitting section has an area greater than or equal to 500 mm².